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# The Choice of Exchange Rate Regimes for EU Accession Countries

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## **Abstract**

*This article examines the institutional changes of Central Banks and the exchange rate regimes of Eastern European countries joining the EU. Current regimes and how they need to evolve in order to meet the entry criteria of the EU and EMU are looked at. In addition, the degree to which the candidate countries meet the accession criteria and compare them with the performance of the latest EU entrants will be studied. After concluding that the accession criteria do not necessarily favour a particular exchange rate regime, the pros and cons of the two plans considered as the most stable, currency board and inflation target will be analysed. Under these two regimes, the respect of the criteria of low inflation and exchange rate stability is likely to produce strong tensions.*

This paper examines the institutional developments of central banks and exchange rate regimes of the old centralised economies of Eastern European countries who have become candidates for accession to the European Union. There are ten countries in the group of ‘official candidate’ countries out of the thirteen countries selected in March 1998 by the process that will make the enlargement of the European Union possible (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia).<sup>1</sup>

This set of countries was split up into two groups according to their degree of advancement upon accession. The Czech Republic, Estonia, Hungary, Poland and Slovenia were supposed to join the European Union (EU) first (Group 1). A second group contained Bulgaria, Latvia, Lithuania, Romania and the Slovak Republic (Group 2) were to join later.<sup>2</sup> Since the Helsinki Summit in November 1999, this ranking has been abandoned and replaced by an unofficial queue system. Each candidate will now be able to move up or down towards membership, depending on their ability to integrate the ‘acquis communautaire’ and satisfy the other membership requirements. There is no doubt that these countries will still come in groups. In addition, countries such as Croatia, which are not currently on the list of ‘official candidates’, but which, given the progress of their transition, are likely to become full members of the Union, before certain official candidates, such as Romania, whose position deteriorated in 2000.

Considering the likely membership dates, none of the leading countries will likely be able to join the Union on 1 January 2003. There is a possibility for the first membership to take place in January 2004, but 1 January 2005 seems to be a safer bet.

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<sup>1</sup> The other three official candidates are Cyprus, Malta and Turkey.

<sup>2</sup> Cyprus was the sixth member of this group.

Further delays are certainly possible, since enlargement is contingent on the success of internal reforms in the European Union. The key institutional reforms required include litigation such as the extent of the national veto, rules (including the weight of national votes), qualified majority voting, and the size of the Commission. Substantive and critical reforms include the Reform of the Common Agricultural Policy. The Nice Intergovernmental Conference of December 2000 failed in its reform of the European institutions with a view to an enlarged union of 25 members. The next serious attempts to create appropriate community institutions are postponed until 2004. The exact criteria for membership have become less clear over time. It is possible to allow more or less long transition periods on issues such as labour mobility and environmental gains. Recently, there have been some suggestions such as a multi-speed Union in which different members might treat newcomers unequally or that each member could give different treatment to each new member. As Berglof and Roland (2000) note: '... membership has become more gradual and its meaning increasingly vague'.

Being a member of the Union does not imply immediate accession to Economic and Monetary Union (EMU). It is, however, true that for all applicants for membership, any derogation, as was the case for the United Kingdom and Denmark, will no longer be possible. The obligation to join the Monetary Union, once the Maastricht criteria are met, will be part of the 'acquis communautaire' that the candidates for membership will have to take into consideration (see Kirrane 1996).

However, appreciating when and if the Maastricht criteria are met will, to a certain extent, remain at the discretion of the candidates. Sweden, for example, had no derogation for EMU, but by not respecting the criterion of participation in the European Monetary System, it avoided having to join EMU (this criterion stipulates that two years of participation in the exchange mechanism are necessary to be able to apply).

The Maastricht macroeconomic criteria for EMU membership are as follows: two financial criteria - a public deficit ratio on GDP up to 3%, and one ratio of public debt to maximum GDP of 60%; an interest rate criterion - nominal long-term interest rates (ten years) on public debt should not exceed by more than 2 percentage points the long-term average of the three least-inflationary countries; a criterion of inflation - the annual inflation rate should not exceed by more than 1.5 points the average of the three least inflationary countries; and finally, an exchange rate criterion - EMU candidates must have (almost surely) adhered to the ERM Exchange Rate Mechanism. In the allowed fluctuation zone of  $\pm 15\%$ , the exchange rate must have been stable (without capital or exchange controls ...) during the two years preceding accession to EMU. Note also the institutional constraint on the independence of the Central Bank.<sup>3</sup>

An important point to keep in mind is that, if the satisfaction of each of the Maastricht criteria individually is accessible to the monetary or budgetary authorities the satisfaction of all these criteria is not satisfied. For example, interest rate and (nominal) inflation targets exert constraints on real interest rates, and nominal exchange rate and inflation targets constrain real exchange rate developments (see Kirrane 1996). Real interest rates cannot be controlled by domestic authorities if there is a high degree of international capital mobility, although they may affect domestic risk premiums (defaults). The real exchange rate (the relative price of tradables on non-tradables) is affected by fiscal policy and other structural measures, but also depends on the

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<sup>3</sup> For further details, see Annex

speed of productivity change in the tradable goods sectors. Thus the probability and the timing of entry will depend on the degree and speed of convergence, the economies of the candidate countries, the European standards, but the criteria do not impose severe constraints on the monetary regime allowed at the moment of membership (see Kirrane 2003). Floating within a narrow target band or zone, active exchange management, a conventional fixed exchange rate, a currency board or a complete and unilateral 'euroisation' are compatible with the Maastricht criteria for accession to EMU.<sup>4</sup>

In this article, the degree to which the candidate countries are currently meeting the two essential criteria for EMU membership will be studied: the inflation and exchange rate criteria, as well as the probability and the desire to see these criteria respected in the next 5 to 10 years.<sup>5 6 7</sup>

Before examining the question of what will be or should be the exchange rate policy of the candidate countries, current practices will be reviewed. Among the 10 EU candidate countries, there are three currency boards, Bulgaria and Estonia vis-à-vis the euro, and Lithuania vis-à-vis the dollar. Latvia applies a fixed exchange rate regime with an anchor to the SDR, Hungary, an inflation targeting system close to an exchange rate target with margins of 15%, and the other five authorise the directed exchange rate flotation. This type of plan covers a wide range of possibilities. As it stands, there is no indication that managed floating rates would be 'good management'. Among the six flexible exchange rates managed, the Czech Republic has an inflation target, excluding administered prices, the Slovak Republic, an inflation target (hard core of inflation), Poland (main inflation target) and the Slovenia, a growth rule for M3. The Central Bank of Romania is looking for price stability as the main objective, but without inflation targeting.

In addition to having different exchange rate regimes, the 10 candidates differ somewhat in their assessment of international capital mobility. Note that all countries comply with Article 8 of the IMF's Articles of Agreement. No country has fully liberalised its capital account, even though Estonia is approaching it. Poland has abandoned its controls on long-term financial flows, but retains some restrictions on short-term financial flows, direct investment and land transactions.

Motivations for imposing controls on capital flows differ among countries and instruments. Controls on short-term capital are often justified by the desire to avoid large fluctuations in

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<sup>4</sup> Is the adoption of the euro as the only domestic currency with legal tender by the candidate for the monetary union consistent with the criteria? A favourable argument is based on the fact that, as it stands, there is no longer any need for the Council of Ministers to decide on the conversion rate to the changeover to the euro. The candidate country has managed to unilaterally determine this rate. Even if the domestic currency is not formally abolished and remains legal tender with the euro, the use of this currency as a means of payment, currency and stock of securities could be easily discouraged. The conversion rate adopted by the Council could be obsolete if the domestic currency de facto or de jure disappeared.

<sup>5</sup> The criterion of independence of the Central Bank does not appear to be essential in the debates on the 'conditionality' of membership of EMU. But it could become a 'mandatory, binding' constraint for one of the most advanced candidates, the Czech Republic, which is currently amending the statutes of its Central Bank in order to comply with the Maastricht criteria. The interest rate criterion will be rather difficult to meet for a number of candidates, because of the tightness, if not the absence, of the 10-year government bond market in many countries.

<sup>6</sup> Exchange rate regimes with several official parities for current account transactions are not considered. It is difficult to envision circumstances in which efficiency, stability and fairness are ensured with an official multi-parity regime. When the same commodity is exchanged at different prices, it generates distortions, corruption and rent seeking. Multi-exchange rate regimes usually involve a 'near-fiscal' deficit for the central bank.

<sup>7</sup> The criteria of public debt and budget deficit have been interpreted with such flexibility for the candidates of the first round (1 January 1999) and for Greece which joined the Monetary Union on 1 January 2001, that it is difficult conceivable to consider a strict interpretation for future candidates. The interest rate criterion is in fact verified if the inflation, exchange rate and public debt criteria are met.

capital inflows and outflows, which could affect the stability of the exchange rate and/or threaten the liquidity or solvency of the domestic financial institutions. Restrictions on the purchase of land or real estate by foreigners tend to be motivated by non-economic considerations.

The word 'short-term' in 'short-term' capital refers to the time remaining to maturity and not to the duration of the investor's holding of the asset. While there are liquid secondary markets for long-term financial assets, frequent reversals in capital flows do not involve the presence of short-term securities. Even direct investment is, in principle, easily reversible if there is a liquid and integrated market for property titles. Even if the share of liabilities expressed in foreign currency remains low (whatever their maturity), speculative pressures on the currency are still possible. What matters is the ability or opportunity to be short on the domestic and long-term currency in spot and forward equity markets.

More generally, the modalities of capital inflows and outflows may differ. Take, for example, the case of Poland, which recently financed a current account deficit mainly through direct investment and privatisation incomes (which therefore means similar movements between capital balances and current balance). Nothing prevents such a country from suffering a speculative attack on its currency through large outflows of portfolio investments, whether short or long term. Although restrictions remain on all international financial instruments, the latter is large enough for each of the candidate countries to be exposed to a threat of a sudden and massive reversal of capital flows.

What is the appropriate exchange rate for each of the candidate countries? In the following analysis, the study will be restricted to the comparison between two exchange rate regimes: the currency board and the floating exchange rate with inflation target. The experience of the last 20 years seems to support the idea that only extremes in the spectrum of exchange rate regimes are viable in an environment with international capital mobility (see, *inter alia*, Fischer, 2001). These two extremes are a credible fixed exchange rate regime and a floating exchange rate. While we will focus on these two cases, we will consider the possibility of making the euro, a parallel currency with legal tender in domestic transactions like the domestic currency.

A common currency or a monetary union clearly represents the most credible exchange rate regime. We consider the Monetary Union as the target regime for candidates who have already joined the European Union. Of course, monetary union with full membership of EMU is not an option prior to accession to the European Union, although the unilateral adoption of the euro as the national currency is.

The next most credible regime is the principle of the currency board, defined here as a fixed exchange rate regime without growth of domestic credit by the Central Bank, i.e. the monetary base is fully guaranteed by the foreign exchange reserves. In the simplest case, these reserves are the only financial asset of the monetary authorities, with the monetary base as the sole liability. The anchor may be based on one currency or a basket of currencies. For simplicity it will be considered that the euro is the only anchor currency. The euro can, but it is not an obligation, to have legal tender in the country having established a currency board.

Several variations around the pure currency board model have been implemented in practice (see for example, Ghosh, Guld and Wolf, 2000). Most involve a complex liability structure or the assets of the monetary authority. For example, domestic commercial banks may have contingent credit lines with the monetary authority; the monetary authority could have contingent credit lines with foreign financial institutions, public or private, and the monetary authority may have

limited power to increase public or private sector credit. Each enhancement of the assumptions of the strict currency board model brings this fixed but adjustable exchange rate regime closer together.

A flexible exchange rate regime is compatible with a different number of nominal pegs, including a price index or inflation rates, or monetary aggregates. Inflation targeting is of interest because of its widespread adoption in recent years and favourable experiences under it. The definition of the appropriate price index as well as the specification of the horizon of this inflation target will be studied below.

The following characteristics of an economy make nominal exchange rate flexibility desirable: (1) high nominal rigidities in domestic prices and /or costs; (2) high volumes of foreign trade in goods and services, low degree of openness; (3) a higher incidence of asymmetric (country-specific) shocks compared to symmetric shocks and/or differences in domestic economic structures or even specific transmission mechanisms that may lead to asymmetric responses to symmetric shocks; (4) a less diversified demand and production structure; (5) a lower degree of international mobility of real factors (in particular the labour factor); (6) the absence of budgetary transfer mechanisms at the supranational and international level.

### **Nominal cost and price rigidities**

While there is no significant nominal rigidities or price rigidities, the choice of the exchange rate regime is largely insignificant. Note that only nominal rigidities matter. A country may be constrained by real rigidities (real wage rigidities, non-flexible relative price, non-wage labour costs high, stagnant productivity of factors of production immobility) and its actual economic performance will be mediocre, without this having implications for the choice of the exchange rate regime. Unless these realities can be effectively addressed through changes in the nominal exchange rate, this country's performance will be equally poor with a credible fixed exchange rate, a floating exchange rate, or a universal bilateral barter system. The severity and persistence of nominal rigidities therefore become a key political and empirical issue. Unfortunately, the empirical results available are extremely opaque and difficult to interpret. Even if information is available, on the rigidity of nominal wage contracts and prices, and on the extent to which they are synchronised, this interpretation is obviously subject to Lucas' criticism. These contractual practices are not statements of fact, but the results of deliberate choices. Changes in the economic environment conditioning these choices will change practices.

Testing for persistence on price and wage data is unlikely to be informative. The observation of correlations between the data reflects both real structural delays, invariant whatever the changes in the economic environment, and anticipation dynamics that will only change if the rules of the game are perceived as having changed. There is no theory of nominal rigidities worthy of the name.

This is an uncomfortable position. Currency matters, although it cannot be explained why (using conventional economic tools). It is believed that the nominal rigidities of wages and prices are common and that they influence real economic performance, but it is not known how to measure these rigidities, nor whether they will be stable according to the different exchange rate regimes under study.

### **Size, degree of openness and direction of trade.**

The relevant unit of measure for understanding 'size' in an economy is market power. A large country has the ability to influence its terms of trade (the relative price of exports and imports) or

the world prices of the financial securities it trades (the international interest rate). In this perspective, even Poland, the most important country of the 10 candidates for membership, is small.

A small country in terms of real goods and services (a price taker on world import and export markets) cannot use fluctuations in its nominal exchange rate to alter its terms of trade. Of course, not all final and intermediate goods and services are traded internationally, and the non-traded is largely labor intensive. Nominal wage rigidities are therefore sufficient to give the nominal exchange rate a (temporary) weight on the real economy, through its ability to influence relative nominal labour costs and profitability.

A common theme in most optimal currency area approaches is that the more an economy is open to trade in goods and services, the lower will be its gains from nominal exchange flexibility (see, *inter alia*, Mundell, 1961; Kinnon, 1963). It should be obvious that this proposal cannot be correct. For an economy completely closed to trade in goods and services, the exchange rate regime is irrelevant from the point of view of macroeconomic stabilisation. If there is a relationship between the degree of openness and the cost of abandoning exchange flexibility, the relationship cannot be monotonous.

Most Eastern European countries are much more open to trade than former EU candidates (Greece, Ireland, Portugal and Spain) at the time of accession. While trade averaged 62% of GDP for previous candidates, this ratio is almost twice as high for the first group (Czech Republic, Estonia, Hungary, Poland, Slovenia), and only slightly lower for the Group 2 (Bulgaria, Croatia, Lithuania, Romania, Slovakia, Latvia) countries. Compared with the two largest countries, Group 1 and previous candidates, Poland is much more open than Spain at the time of its membership. Even today, the share of Spain's trade relative to GDP does not represent a larger share than that of Poland. This conclusion is maintained if GDP is estimated using purchasing power parity (PPP) rather than using current exchange rates. However, the share of Spain's trade in absolute terms is now higher than that of Poland. This is true for the averages of the ratio of group 1 and former candidates. Also, in the case of evaluation using exchange rates compatible with the PPP, the share of trade in GDP is higher in former candidates at the time of accession than in the countries of the group 2.

The share of the candidate countries' trade with the Euroland countries is important: For the Group 1 countries, this share exceeds 50% and it amounts to more than 70% if all the countries of the European Union are included and the thus, the likelihood that these countries will be strongly affected by a trade shock from a country or region outside the Union, is rather weak.<sup>8</sup> Even during the turbulence of the Asian and Russian crises, Group 1 countries, with the exception of Estonia, were no more affected than the Euroland economies (see Transition Report 1999).

According to conventional theory, this concentration of trade suggests that the candidate countries to the Union would find an anchorage quite natural in the euro, if they chose to opt for the principle of a currency board. However, this argument does not seem robust. Probably having a flexible exchange rate vis-à-vis one of these major trading partners would be desirable in the presence of frequent significant real shocks that require adjustment of relative international prices, since, in the presence of nominal price and cost rigidities, such an adjustment is more

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<sup>8</sup> But not insignificant, as demonstrated by the recent surge in the price of crude oil.

easily achieved using a nominal exchange adjustment rather than using changes in domestic and foreign nominal costs and prices, at given nominal exchange rates.

Whatever the merits of the theoretical argument linking exchange rate flexibility and openness, it is clear that, through most measures, current candidates are more open than Greece, Ireland, Portugal at the time of their accession. In addition, most maintain a very high proportion of their trade with a single monetary unit: Euroland.

### **Asymmetric shocks or transmission**

The strict monetary policy framework imposed on members of a monetary union is more costly if the Member State is subject to strong asymmetric shocks or if its structure is such that it leads to asymmetric shocks on production and employment. The idea that a fixed exchange rate is more appropriate when the structure of production and demand is broadly diversified should be understood as a proposition on the conditions under which asymmetric shocks are less likely.

Two considerations support the proposition that asymmetric shocks make it desirable to maintain exchange rate flexibility. First, fluctuations in the nominal exchange rates only appropriate response to asymmetric shocks on the markets for goods and services, that is to say IS shocks and shocks on aggregate supply. In response to asymmetric monetary shocks (shocks on LM), a constant nominal interest rate is an appropriate policy. In an environment characterised by perfect mobility of financial capital, a constant nominal interest rate translates into a constant expected rate of exchange rate depreciation. A credible exchange rate is the easiest way to provide this optimal response to shocks on LM.<sup>9</sup>

Secondly, it is important not to be overly impressed by the efficiency of the financial markets in general, and the exchange markets in particular. The foreign exchange market and the exchange rate can be a source of exogenous shocks as well as a mechanism for adjusting to shocks on the fundamentals. One does not go without the other. The potential benefits of exchange rate flexibility, as an effective adjustment mechanism or shock absorber, are counterbalanced by the indisputable disadvantages of excessive disruptions and erratic currency fluctuations, inflicting unnecessary real adjustments on the rest of the economy.

### **Limited mobility of real resources**

It is clear that a high degree of mobility of real factors can be an effective substitute for nominal exchange rate adjustments in the face of asymmetric shocks. Indeed, factor mobility allows real long-term or even permanent adjustments to real asymmetric shocks, a response that nominal exchange flexibility cannot allow. The real factors whose mobility matters are real capital and labour.

The mobility of real capital, within and between nations, is imperfect or limited, even when the mobility of capital is perfect. As soon as the physical capital (plant, machinery and other equipment, infrastructure) is installed, it becomes expensive to move it geographically. There are some examples of capital movements such as Jumbo jets, which move quickly and at low cost, as well as complete plants moved by rail or boat. The conventional view in the literature is that, in a first approximation, real capital cannot be displaced. Gross new investment can effectively be reallocated within national borders, and the mobility of financial capital can facilitate this

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<sup>9</sup> This is a direct extension of Poole (1970) to an open economy in an environment of integrated global financial markets (see Buiter, 1997).



process, by allowing the decoupling of national savings and gross fixed capital formation. This is not, however, a truly meaningful process with regular frequency.

The technological developments of recent decades could make the argument that physical capital, once installed, is very expensive to move, less relevant. While a conventional machine is potentially disproportionately expensive to move, many assembly lines of high-tech products are very expensive in relation to their weight, volume, fragility and generally unmanageable nature - the approximate determinants of the cost of a move. They can be and are displaced over large distances in response to changes in the relative costs of production (or changes in other determinants of profitability).

There are still many barriers to labour mobility between the EU candidate countries and current EMU and EU members. Many obstacles are of a cultural nature, including linguistic, as well as legislative and administrative. While within the current EU, work permits are old history and mutual recognition of professional qualifications is now the norm rather than the exception, cross-border mobility between members the Union remains limited.

Whatever the cultural, legislative or administrative obstacles to labour mobility between EU candidate countries and current members (in the years preceding and following accession), net migration flows between two regions or countries are assured to be more important where differences in real wages or per capita income level are high.

### **Supranational fiscal stabilisation**

Would a supranational fiscal authority, with a serious redistributive capacity of current EMU members towards accession candidates, compensate for the loss of foreign exchange instrument in the event of a currency board being adopted vis-à-vis the euro, or in due course, in case of adoption of the euro? A brief technical answer is 'no'. Fiscal stabilisation policy will be effective if differing taxes and borrowing to finance the resulting revenue loss can increase aggregate demand. This will be the case, if consumers are short-sighted, and are unable to realise that the present value of present and future taxes would not be affected by the imposition of taxes, or if the tax credits redistribute resources between households with different propensities to consume.

Unless the supranational fiscal authority of a monetary union has privileged access to the financial markets, there is nothing the federal authorities can achieve in terms of fiscal stabilisation that cannot be achieved by the national authorities' budgets, or less. The surpluses and deficits of the national authorities, reflected to some extent by imbalances in current national balances, are a perfect substitute for supranational fiscal stabilisation.

A study by Bayoumi and Masson (1994), based on earlier work by Sachs and Sala-i-Martin (1992), analyzes regional tax flows federal government and transfers to the United States and Canada. They try to distinguish between long-term budget flows (the redistributive element) and short-term responses to regional business cycles, which they identify as the stabilising element. They show that in the United States, long-term flows amount to 22 cents per redistributed dollar to 31 cents per dollar for the stabilisation share. In the case of Canada, the corresponding figures are 39 cents and 17 cents respectively. Although interesting, these studies do not tell anything about the possibility of the policy of compensation for the loss of the exchange instrument of the candidate country renouncing its monetary autonomy. The long-run redistributive properties of the budget are irrelevant because the exchange rate is not a long-term redistributive instrument. The stabilising properties of the tax system are important, but this stabilisation can equally be ensured at the supranational or national level or even lower.

To the extent that monetary union is part of a wider political integration project, political pressures can emerge for long-term redistribution among its member countries. What the Bayoumi and Masson studies, as well as Sachs and Sala-i-Martin, teach us is that the United States and Canada are societies, not just economies, and also how national solidarity and regional social cohesion are concretised as redistributive measures through a budgetary transfer mechanism.

### **Currency board or inflation target: which dominates?**

The currency board.

A currency board is certainly the most credible fixed currency regime, although everything that has been done politically, can be also politically defeated. A pure currency board has two key features: an irrevocable exchange rate and the prohibition of domestic credit expansion by the Central Bank. The total monetary base is guaranteed by foreign exchange reserves. There are several advantages, all of which imply that this institutional arrangement is perceived as credible and permanent.

The first advantage is that the cost, in real terms, of a currency board is lower than that of a traditional monetary authority. Of course, banking regulation and supervision are still necessary, but they are not necessarily the responsibility of the monetary authorities.

The second advantage is that a nation adopting such a regime abandons definitively budget deficits financed by printing money. In a well-managed economy, with authority benevolent, competent and credible policy, it would actually be a disadvantage (see Calvo et al., 1992) as seigniorage can be a source of useful tax revenue for a government in need of cash. There is no reason to believe that the rate of inflation observed with a currency board regime will always be close to the optimal rate from the neoclassical point of view of public finances.

However, political economy teaches that the printing press is a great seducer and that the freedom to issue monetary instruments at will is often a brutal lesson in inflation. Of course, a reasoned expansion of domestic credit by the monetary authorities is not achieved solely by means of a currency board.<sup>10</sup> Any independent central bank (either instinctively conservative with operational independence and target independence, or only with operational independence but dedicated to price stability by external mandate) can, in principle, prevent printing money from being abused. This, however, poses a number of key questions. Is policy and the Independent Central Bank compatible in both operational and target terms? How would such a Central Bank incorporate a mandate decreed from outside price stability? And who would impose such a mandate?

In many countries in transition, the Central Bank is simply not independent. And when it is independent, it is not an effective independence. The problem is accentuated by the fact that central banks in countries in transition, far from restricting their action to that of a traditional central bank, namely monetary policy, supervision and regulation of banking and financial systems, also play a development bank role with commercial objectives.

Among the traditional functions of the Central Bank is that of lender of last resort, which avoids liquidity crises, such as bank rushes during a financial crisis. In such circumstances, the Central Bank should lend freely against the best collateral available, and at repressive rates. If a liquidity

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<sup>10</sup> If this is the case, the whole world would not be able to put in place reasoned domestic credit expansion policies

crisis becomes a solvency crisis, the Central Bank does not have resources to act effectively. Only the state, through the Treasury with its fiscal power, has the capacity to recapitalise insolvent financial institutions.

A clear disadvantage of the principle of the currency board is that there can be no lender of last resort, since any expansion of the of the Central Bank and is prohibited (see Chang et al., 1998, della Paolera et al., 1999). There are several ways to partially privatise the lender of last resort by allowing contingent credit lines, but this is inevitably limited.

A currency board acquires all its meaning for a small, highly open country. In this case, this country has to anchor its currency to a currency or basket of currencies which represents an essential part of these external exchanges. For all the candidate countries, the euro (or any basket of currencies with the euro in a dominant proportion) would be a natural choice. Relying on the dollar or SDRs is the doorway to problems.

The various experiences of currency board

It has often been mentioned that the principle of the currency board (like any fixed and credible exchange rate regime) implies a significant cost in terms of real growth anticipated for the long term because the central bank is unable to stabilise production as a result of asymmetric shocks. A recent paper by Ghosh et al. (2000) discredits this vision by systematically studying the growth performance of countries that have implemented a currency board. Under the control of traditional growth factors, they showed that, contrary to a reduction in growth, better performances were achieved. The obvious criticism of this type of approach highlights what econometricians call selection bias in the sample. It may well be that the powers of the governments of countries with currency boards are high, while conversely the skills of the other countries are more mixed. In countries in transition, there is also little evidence that the currency stability of countries with currency boards has been traded for real growth or stability of production. Even though Bulgaria and the Baltic countries have suffered from the Russian crisis and the Kosovo crisis, it can be argued that the situation could have been worse without a currency board.

### **The inflation target**

The inflation target has been in vogue in most industrialised countries for some time. Although the Fed does not respect it formally, its operating rules under the chairmanship of Volcker and Greenspan, in fact follow an inflation target. The Bank of England has been using it since 1992 and the ECB since 1999 (even without admitting it). New Zealand, Australia and Canada also use an inflation rule. So why not candidates to the Union?

Although there are some differences among the monetary authorities mentioned above in how to build and implement an inflation target, there is a common set of key common requirements. This goes far beyond the announcement by the government of a short-term inflation target. This can be summarised as follows: 1. the public announcement of a medium-term inflation target for a clearly defined basket of goods and services;<sup>11</sup> 2. an institutional commitment to price stability, the main objective of monetary policy, to which all other objectives are subordinated; 3. a credible set of monetary instruments linked to the medium-term inflation objective, which

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<sup>11</sup> It can be a target point, a fork or a ceiling.

<sup>12</sup> The Fed does not announce a numerical value for its inflation target. Its objectives include the pursuit of full employment, price stability and interest rates.

mobilises all available information; 4. transparency of monetary policy through public statements.

The inflation rule has the advantage that a country can maintain control over its money supply, which is desirable in the case of asymmetric shocks. Nevertheless, in many countries it has been difficult to take advantage of this advantage. Monetary independence allows flexibility (the possibility of responding to shocks), but the flip side of this flexibility is opportunism, that is, a discretionary policy, in the negative sense of the absence of a credible pre-commitment. Independence coupled with opportunistic discretion has been discredited by the inflationary experience of the 1970s, and rules-based monetary policy, i.e. monetary policy based on credible pre-commitment, enjoys unparalleled prestige among orthodox economists. Of course, rules can, in principle, be flexible, contingent rules that allow responses based on events. Unfortunately, it seems rather complicated to put in writing the optimal rule (flexible, but with commitment). For example, in the case of New Zealand, one of the first converts to monetary policy rules, there is now a consensus that the Central Bank does not have sufficient positive discretion; for example, flexibility, at the dawn of the Asian crisis.

In addition, the benefits of monetary independence in most candidate countries should not be overestimated. Monetary policy will certainly not be effective in stabilising production because credit, deposits and debt markets are still underdeveloped. In addition, especially for the least developed countries, a substantial share of deposits and credits continues to be expressed in foreign currencies. Thus, changes in the costs and availability of domestic credit cannot have a significant and immediate impact on production through the credit channel and the interest rate channel.

To accept inflation as the ultimate goal of monetary policy by abandoning the objective of stabilising the exchange rate can have major consequences for the banking system. Especially in the least developed countries of the zone, large shares of banks' balance sheets are expressed in dollars and other hard currencies. Although bank balance sheets are balanced against liabilities and foreign currency assets, this is not adequate insurance against losses in the event of large exchange rate fluctuations. Significant depreciation can lead to the default of foreign currency indebted counterparties to the bank without having balanced their foreign currency positions in their balance sheets. Such defects can have destabilising effects on the banking system.

A more important requirement than the inflation target is the central bank's institutional commitment to the goal of price stability. This keeps the Board of Governors of Monetary Authority away from partisan political debate. Bank board members should not have close relations with political parties or factions. They should be appointed for a single term, which should be longer than the election cycle.

The success of an inflation rule is based on a reputation that is hard to grasp. The Bundesbank, for most of its existence, like the Fed, has a divine status in the eyes of the public. Thus, they were or are relatively well isolated from short-term political pressures. No government or academic in Germany criticised the Bundesbank for cyclical slowdowns.

The experience of the Bank of England has shown that it is possible to gain the confidence of the financial markets without having to build a reputation with care over the long term. A key element in gaining a reputation is transparency and active engagement in explaining political decisions to the public. The Bank of England, which acquired its operational independence only in June 1997, went further by publishing these meetings for a fortnight at monthly rates, the

minutes of its meetings, as well as the votes of each of the members of the Monetary Policy Committee. It also publishes a quarterly inflation report, summarising its perception of the performance of past and future monetary policy and its inflation forecasts. Some authors do not hesitate to say that public communication of its strategy has been a central element of success of the inflation rule in developed countries in recent years. In the same vein, the lacklustre results of the ECB since January 1999, have been attributed to its lack of openness, transparency and responsibility under its objectives and operational procedures

### **The optimal inflation target**

In recent years, many studies have focused on what constitutes an optimal inflation rate. This involves the composition of the target basket, the horizon of that target, and the numerical value assigned to that target. Currently the Central Bank of the Czech Republic pursues a target of net inflation (inflation of administered prices and the effects of tax developments) from 15 to 30 months. The Central Bank of Poland, however, targets inflation at 18 months.

The consensus regarding broadly-based economies appears to be a medium-term horizon for the inflation target to filter out temporary changes in the inflation rate, such as those due to transitory changes in the exchange rate. The advantage of this approach to targeting a consumer price basket is all the greater as the economy is open and capital flows are volatile. Especially when the domestic financial markets and the forex market lack depth and breadth, capital flows can easily have temporary effects on the exchange rate.

The challenges posed by international financial integration will continue to be important for the candidate countries, but ultimately its effects are likely to be beneficial, and will enable effective regulation and supervision of markets and financial institutions. With a rapidly aging population, domestic savings rates are probably insufficient to finance the replacement of installed capital and the expansion needed to catch up with the EU (see Transition Report 2000). FDI flows are crucial for the international transfer of technology and know-how. The possibility of international portfolio diversification offers opportunities for coverage not available at the domestic level.

The downside of this international financial integration is that the international market system can be a source of volatility, shocks and instability (see Kirrane 2003). Exchange rate volatility is reflected in the volatility of prices of imported goods and fluctuations in the rate of inflation. This effect is all the stronger as the economy is open to trade in goods and services. An undesired sensitivity of domestic monetary policy to short-term movements in the rate of inflation can be destabilising for the real economy.

### **When the Balassa-Samuelson effect meets union exchange and inflation rate criteria**

There may be a conflict between a key characteristic of the candidates for membership and the inflation and exchange rate criteria for participation in EMU membership. It will now be shown that, unless the inflation criterion is relaxed or reinterpreted for candidates adopting the principle of the currency board (or any other credible fixed exchange rate regime), EMU will only be accessible at the price of an unnecessary recession of the candidates' economies.

Similarly, for monetary union candidates adopting a floating exchange rate regime, it would be necessary to reinterpret the criterion of exchange stability if the inflation criterion is met. In fact, unlike a significant exchange rate depreciation, significant exchange rate appreciations should be allowed during the two-year period.

Together the inflation and exchange rate criteria reduce the extent of fluctuations for the real exchange rate for Euroland entry candidates. Thus, for example, a real appreciation implies either a nominal appreciation (at constant inflation rates of both candidates and Euroland) or a higher rate of domestic inflation than that of Euroland (at constant nominal exchange rate).

The real exchange rates of countries in transition are volatile and subject to significant fluctuations over the medium term. There is little doubt, however, that for most candidates, in parallel with the process of transition and convergence, a significant appreciation of the real exchange rate can be anticipated.

Thus, under reasonable assumptions, the difference between the inflation rates of the two entities is equal to the proportional rate of depreciation of the nominal exchange rate plus the (common) share of non-tradable goods in the consumption basket multiplied by the productivity growth differential between the candidate country's tradable and non-tradable sectors on the same differential calculated for Euroland. It seems possible that the difference in productivity growth between the tradable and non-tradable goods sector is greater for the candidate country than in Euroland, since productivity convergence could be faster in the exposed sector than in the protected area. This means that the relative price of non-tradable goods on tradable goods will grow faster in the candidate country than in Euroland. This implies that, given an exchange rate, the overall inflation rate will be higher for the candidate for accession than in Euroland.

Second, the difference between real GNP per capita is larger if it is estimated at the market exchange rate rather than using an exchange rate from the PPP. The average real per capita income of Group 1 is 21% of the one calculated in Euroland, when the market exchange rate is used and 48% with PPP exchange rate. This implies that the relative price of non-tradable tradable goods is lower in the candidate countries than in Euroland, reflecting a larger differential between productivity levels in Euroland's tradable goods sector and between productivity levels in the non-tradable goods sector. If there is gradual convergence on a sector-by-sector basis, the relative price of non-tradable goods will rise in countries in transition, while the productivity growth differential between tradable and non-tradable sectors is assumed to be greater than the productivity growth differential in the corresponding Euroland. If, in case of full utilisation of production capacity and a fixed exchange rate, the inflation rate seems to exceed the 1.5% allowed by the Maastricht criterion, the only way for a candidate to respect the criterion of inflation in fixed exchange rates would be to accept a one-off recession to reduce the rate of inflation for a period of at least one year to return to the level required by the Maastricht Treaty. By joining the EMU, however, the inflation rate in the former candidate country will continue to exceed that of the older EMU members, a margin implied by the Balassa-Samuelson effect, as long as these cross-sector productivity growth differentials will not converge.

A more elegant solution, allowing EMU candidates to maintain a fixed exchange rate without suffering an unnecessary recession, would be to redefine the inflation criterion in terms of the inflation rate of traded goods only.

Establishing a currency board when the domestic inflation rate is well above what can be explained by the Balassa-Samuelson effect would lead to a period of declining competitiveness due to inertia or roughness in the domestic price-wage loop. Reducing inflation to the required level, at fixed exchange rates, by the Balassa-Samuelson effect and compensating for the initial loss of competitiveness will require a period of overcapacity. Inflation rates still differ significantly among EU applicants.

In Group 1, the lowest inflation rate in 1999 was achieved by Czech Republic, with 2.1%. Hungary obtained the highest rate with 10.1%, followed by Poland with 7.3%. The inflation rate of Poland in 2000 is certainly closer to 10% as that of Hungary.

Note that if an EMU candidate subject to the Balassa-Samuelson effect chose to let its exchange rate float, it would have problems to meet the Maastricht criteria. Consider the case of a monetary policy in a candidate country whose objective is to restrict inflation to 1.5% above the Euroland level, but the differential of inflation generated by the Balassa-Samuelson effect is greater than 1.5% for a given exchange rate and full employment of production capacity. The answer to the equilibrium of the exchange rate would be an appreciation. This could prevent the candidate from complying with the exchange rate criterion, depending on the interpretation used. The Balassa-Samuelson effect certainly does not exceed the 15% fluctuation range of the European Exchange Rate Mechanism for two years, assuming that the exchange rate starts in the middle of the band, but the treaties do not specify whether is sufficient to stay within the allowed fluctuation band to satisfy the exchange rate criterion. One way of solving this problem would be to accept an asymmetric interpretation of the exchange rate criterion, allowing revaluations but not devaluations.<sup>13</sup>

As long as the transitioning candidate has not structurally evolved to the point where there is no need for a firm appreciation of its exchange rate, it may be difficult to jointly respect the inflation and exchange rate criteria. The two ways to solve this dilemma are (1) to reinterpret the inflation criterion and apply only an inflation rate on tradable goods and (2) to meet the exchange rate stability criterion in an asymmetrical manner, allowing real nominal appreciations during the two years preceding EMU accession.

### **The euro: a parallel currency for candidates for membership**

A way for a candidate country to express its wish to eventually integrate EMU is to accept the euro as parallel currency. The euro would be declared legal tender for all transactions within the jurisdiction of the candidate country, in the same terms as the domestic currency. Residents could open euro accounts in local financial institutions. The introduction of the euro as a parallel currency, that is to say, as a competing currency with legal tender status, circulating with domestic currency and freely convertible could bring additional monetary discipline. The two currencies would become closer substitutes. By making the euro a better direct substitute for the local currency, any temptation to finance by inflation would result in a shift in the demand for money from the local currency to the euro. Ultimately, any expectation of non-zero depreciation of the currency against the euro should lead to zero demand for local currency. Conversely, any non-zero appreciation of the currency against the euro should translate into a demand for euros for zero domestic transactions - a pure Kareken and Wallace world (Kareken and Wallace, 1981). But with more realistic conditions, the sensitivity of the demand for the local currency to the appreciation/depreciation of the exchange rate would be certain to increase if the euro were legal tender.

A variety of exchange rate and currency regimes are compatible with such a direct monetary competition. At one extreme, there is the unilateral adoption of the euro as the sole legal tender, and the elimination of the domestic currency. A currency board is consistent with a parallel circulation of the euro, as well as directed floating exchange rates. Of course, if the euro and the

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<sup>13</sup> The Treaty does not explicitly prohibit revaluation or exchange rate appreciation. Only devaluations are explicitly designated as incompatible with participation in EMU.

local currency become perfect direct substitutes, even a floating exchange rate would only be compatible with constant exchange rate equilibria. Any anticipation of depreciation or appreciation would imply the total abandonment of the currency which is supposed to weaken.

There is a historical precedent with parallel currencies and with the behaviour of inflation rates for two currencies and the rate of exchange between them. A system of parallel currencies or dual currency has been successfully used as a transition mechanism to achieve monetary stability in Brazil in 1994, during the 'Plan Real'. Brazil adopted a new currency, the real, anchored and completely guaranteed by dollar reserves. The real circulated in parallel with the old currency, the cruzeiro, which was the Brazilian fiduciary currency unrelated to the dollar. After a few months, the economic agents turned, on their own initiative, to the new currency to pay their bills and sign contracts. They gradually abandoned the old currency as a means of transaction. The result was a rapid reduction in the real value of the old currency and its de facto (and later de jure) abolition. Later still, of course, the link between the real and the dollar was abandoned and the real became nominal.

Parallel currencies have an even older history and are found in Eastern countries during extraordinary periods. In 1921, the Soviet government, in the framework of the New Political Economy (NEP), decided to create a new currency, chervonets, pledged on gold. For two years, this currency circulated in parallel with the ruble (called sovnznak). Prices stabilised immediately in the new currency, while inflation and devaluation continued in the old currency, with monetary financing of the deficit (with the old currency). When the budget returned to equilibrium in 1924, the old currency had been completely repudiated with hyperinflation and all contracts were expressed in chervonets at stable prices (Cagan 1956, Rostowski and Shapiro 1992, Fischer 1994).). This case study can be analysed as a real-time approximation of the Kareken-Wallace equilibrium.

### **Conclusion: is the target of inflation a better option than a currency board for candidate countries for membership?**

The criteria for entry into the Economic and Monetary Union include, in their current version, a ceiling for the inflation rate allowed, one year before accession, in relation to the price of a basket of consumer goods defined by Eurostat. A constraint or objective of exchange rate stability is also imposed for a period of two years before accession. The fluctuation margins (assumed +/- 15%) allowed must be met without devaluation.

It is clear that these criteria do not allow a perfect match with either a currency board or an inflation target. Due to the Balassa-Samuelson effect, the introduction of a currency board may well not generate an inflation rate below the maximum threshold imposed by the Maastricht Treaty, unless the economy is managed with a waste of resources.

A pure inflation target is consistent with a highly volatile exchange rate and persistent medium-term misalignments. The credibility of any inflation target will be trimmed by the requirement to see the exchange rate maintained in a specific target area. In addition, the inflation criterion of the Maastricht Treaty implies a gross consumer price index, without distinction between current inflation and the hard core of inflation or between permanent and transient effects in the rate of inflation.

It seems unlikely that the principle of the currency board can be used to satisfy the entry-to-EMU inflation criterion without unnecessary recession. The reasonable alternative, a re-specification of



the inflation ceiling for the price of tradable goods (and preferably in terms of the hard core of the price inflation of tradable goods), would require a change in the treaty.

The inflation target can, unless the exchange rate becomes too volatile, make it possible to achieve the stability of the exchange rate and inflation required for EMU membership, if the exchange rate is interpreted asymmetrically, allowing for assessments or revaluations.

The introduction of the euro as a parallel currency in the countries in transition deserves serious consideration. Such a decision is without prejudice to the details of the monetary regime and the exchange rate. It could be interpreted as a means of signaling the wish for a possible 'euroisation', through EMU membership, without the obligation to abandon the local currency by unilateral euroisation.

## **ANNEX Criteria for EU and EMU**

### **The criteria for EU membership.**

In 1993, at the Copenhagen European Council, Member States made a significant step towards enlargement by stating that 'The associated countries of Central and Eastern Europe, if they so wish, may become members of the European Union'. This declaration goes on to state the criteria to be met by countries before accession, the Copenhagen criteria.

*As stated in Copenhagen, membership requires that the candidate country:*

- *has achieved institutional stability that guarantees democracy, respect for the law, human rights and the protection of minorities; the existence of a market economy such as the ability to cope with competitive pressure and market forces within the Union; the capacity to assume the obligations of membership including the aims of political, economic and monetary union;*
- *the conditions for its integration through the reform of its administrative structure, so that the Community legislation transposed into national legislation is effectively put into effect through the administrative and legal structures.*

Thus, the only condition in these criteria that raises the question of the monetary regime is that each member makes the necessary efforts to join the Economic and Monetary Union in the medium term. None will be able to negotiate an option such as that of Great Britain.

### **The criteria for joining EMU.**

The criteria for joining the Monetary Union are much more specific. They set clear targets for inflation, the nominal interest rate, the exchange rate, the budget deficit and the debt-to-GDP ratio.

**Rate of inflation:** A Member State will have to prove a price stability that is sustainable and an average rate of inflation, observed over a period of one year before examination, which should not exceed by more than 1.5 point that of the three Member States the best in terms of price stability. Inflation should be measured using the consumer price index on a comparable basis, taking into account differences in national definitions.

**Interest rate:** Over a period of one year before examination, a Member State must have an average interest rate which must not exceed by more than 2 points, that of the three best-performing countries in terms of price stability. Interest rates should be measured on the basis of long-term government bonds, or comparable securities, taking into account national differences.

Exchange rate: A Member State will have to respect the normal fluctuation margins at work in the European Monetary System without significant tensions for at least two years before examination. In particular, the Member State shall not devalue its currency on its own initiative over the period.

Fiscal deficit: The fiscal deficit should not exceed 3% of GDP, or should fall substantially, or only temporarily above this debt ratio threshold. The gross public debt must not exceed 60% of GDP at market prices, or will have to show at least a significant decrease (in rates) and approach the reference value at a satisfactory rate.

Thus, a fixed exchange rate vis-à-vis the euro (including a currency board with the euro as a reference) should be consistent with the Maastricht criteria, such as a floating exchange rate regime that would not allowed fluctuation margins, currently 15%.

## References

BALASSA, B. (1964). The Purchasing Power Parity Doctrine: A Reappraisal, *Journal of Political Economy*, December.

BAYOUMI, T. and P. R. MASSON (1994). Fiscal flows in the United States and Canada: Lessons for monetary union in Europe. Discussion Paper 1057, *Centre for Economic Policy Research* (November).

BEAUMONT C., R. CORKER, R. VAN ELKAN and D. IAKOVA (2000). Exchange Rate Regimes in Selected Advanced Transition Economies-Coping with Transition, Capital Inflows, and EU Accession. *IMF Policy Discussion Paper* PDP/00/3.

BERD (2000). Transition Report 2000, London, UK.

BERGLOF, E and ROLAND, G. (2000). From Regatta to 'Big Bang' - The Impact of the EU Accession Strategy on Reforms in Central and Eastern Europe, *IMF Working Paper*, August.

BUITER, W. (1997). The economic case for monetary union in the European Union. in C.Deissenberg, R.F. Owen and D. Ulph eds. European Economic Integration, supplement to the *Review of International Economics*, 5(4): pp. 0-35.

BUITER, W. H. and SIBERT, A. S. (2000). Targets, Instruments and Institutional Arrangements for an Effective Monetary Authority, Seventh L.K. Jha Memorial Lecture, October, Reserve Bank of India.

CAGAN, P. (1956). The monetary dynamics of hyperinflation, in Milton Friedman ed. *Studies in the Quantity Theory of Money*, Chicago, the University of Chicago Press.

CALVO, G. A. and LEIDERMAN, L. (1992). Optimal inflation tax under pre-commitment: Theory and evidence. *American Economic Review* (March), pp. 179-94.

CHANG, Roberto and VELASCO, Andres (1998). Financial fragility and the exchange rate regime. *NBER Working Paper* 6469 (March).

CHRISTOFFERSON, P. F. and WESCOTT, R.F. (1999). Is Poland Ready for Inflation Targeting? *IMF Working Paper* WP/99/41.

DELLA PAOLERA, G. and TAYLOR, A. (1999). Internal versus external convertibility and developing country financial crisis: Lessons from the Argentinean bank bailout of the 1930's. *NBER Working Paper* 7386 (October).

FISCHER, S. (1994). Russia and the Soviet Union Then and Now, in O.J. Blanchard, K.A. Froot and J.D. Sachs eds. *The Transition in Eastern Europe, Vol. 1. Country Studies*, pp. 221-252. NBER, The University of Chicago Press, Chicago and London.

FISCHER, S. (2001). Exchange Rate Regimes: Is the Bipolar View Correct?, Mimeo, IMF, January.

FRANKEL, J. A. (1999). No single currency regime is right for all countries or at all times. *NBER Working Paper* 7338 (September).

GHOSH, A. R., GULDE, A.-M. and WOLF, H. C. (2000). Currency boards: more than a quick fix, *Economic Policy*, 31, October 2000, pp. 271-335.

GULDE, A.-M., KÄHKÖNEN, J. and KELLER, P. (2000). Pros and Cons of Currency Board Arrangements in the Lead-up to EU Accession and Participation in the Euro Zone, *IMF Policy Discussion Paper*, PDP/00/1, January,

HESTON, A., NUXOLL, D. A. and SUMMERS, R. (1994). The Differential-Productivity Hypothesis and Purchasing-Power Parities: Some New Evidence, *Review of International Economics*; 2(3), October, pp. 227-43.

KAREKEN, J. WALLACE, and N. (1981). The indeterminacy of equilibrium exchange rates, *Quarterly Journal of Economics*, 96, May, pp. 207-22.

KIRRANE, Chris. (1996). Maastricht and Monetary Cooperation. *European Economic Integration Review*, Vol. 14, p.49-59.

KIRRANE, Chris. (2003). The EMS and the Euro. *European Political Economy Review* No. 1 (March 2003), pp. 153-65

MASSON, P. R. (1999). Monetary and exchange rate policy of transition economies of Central and Eastern Europe after the launch of EMU. *IMF Policy Discussion Paper* PDP/99/5.

MCKINNON, R. I. (1963). Optimum currency areas. *American Economic Review* 53 (September), pp. 717-25.

MISHKIN, F. S. (2000). "Inflation targeting in emerging market countries." *NBER Working Paper* 7618.

- MORALES, A. R. (2000). Czech Koruna and Polish Zloty currency options: information content and EU-accession implications. *IMF Working Paper* WP/00/91.
- MUNDELL, R. A. (1961). A theory of optimum currency areas. *American Economic Review* 51 (September): pp. 657-65.
- POOLE (1970). Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macromodel, *Quarterly Journal of Economics*, 84, pp. 197-216.
- ROSTOWSKI, J. and SHAPIRO, J. (1992). Secondary Currencies in the Russian Hyperinflation and Stabilisation of 1921-1924, *LSE Centre for Economic Performance Discussion Paper* n° 59,
- ROUBINI, N. (1998). The case against currency boards: debunking 10 myths about the benefits of currency boards. NYU Stern Mimeo.
- SACHS, J. D. and SALA-I-MARTIN, X. (1992). Fiscal federalism and optimum currency areas. in Matthew B. Canzoneri, Vittorio U. Grilli and Paul R. Masson, eds., *Establishing a central bank: Issues in Europe and lessons from the U.S.* Cambridge, UK: Cambridge University Press.
- SAMUELSON, P. A. (1964). Theoretical Notes On Trade Problems, *Review of Economics and Statistics*, May.
- SAMUELSON, P. A. (1994). Facets of Balassa-Samuelson Thirty Years Later, *Review of International Economics*; 2(3), October, pp. 201-26